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METHOD FOR PRODUCING A COMPRESSED
BODY OF MIX-POWDER FOR CERAMIC

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(NASA-TM-77238) METHOD FOR PRODUCING A
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16. Abstract Under the invented method, a compressed body of mix-powder for ceramic is produced by mixing and stirring several raw powder materials with mixing liquid such as water, and, in the process of sending the resulted viscous material pressurized at 5 kg/cm - 7kg/cm, using 1.5-2 times the pressure to filter and dehydrate, adjusting the water content to 10-20%.			
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METHOD FOR PRODUCING A COMPRESSED
BODY OF MIX-POWDER FOR CERAMIC

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Specifications

1. Name of Invention

/383*

Method for producing a compressed body of mix-powder for ceramic.

2. Requested Patent Coverage

Method for producing a compressed body of mix-powder for ceramic, which comprises the process of mixing and stirring several raw powder materials and mixing liquid such as water, and, in the process of sending the resulted viscous material pressurized at 5kg/cm² - 7kg/cm², using 1.5-2 times the pressure to filter and dehydrate, adjusting the water content to 10-20%.

3. Explanations of the Invention

Of methods for producing mixepowder for ceramic (hereafter referred to as mix-powder), this invention concerns, in particular, the method for producing a compressed body of mix-powder.

Up to now, the production processes of this type of mix-powder involved, as shown in Figure 1: (a) several raw materials such as barium carbonate and titanium oxide, in powder form, are measured and mixing liquid such as water is added, (b) they are mixed and stirred

*Numbers in the margin indicate pagination in the foreign text.

in an apparatus such as ball mill to become viscous material; and (c) dehydrated and filtered in a compression-dehydrating apparatus such as filter press. The main body of the filter press is shown in Figure 4: from the right, filter frame 1, filter cloth 3, filter plate 2, filter cloth 3, filter frame 1.... are attached together. The viscous material is pressurized by reciprocating pump (not shown), etc., led to the inlets 4 on upper corders of filter frame 1, and then led to the compressed body molding chamber 8 through the groove on the upper corner of the inside of the filter frame 1. Here, the moisture in the viscous material passes through the filter cloth 3, placed between the filter frame 1 and filter plate 2, and the drainage 7 at the lower part of the filter plate 2, to be drained through the drainage 5 on both sides of the lower portions of filter frame 1 and filter plate 2. On the other hand, the powder in the viscous material, as it cannot pass through the filter cloth 3, is remained in the compressed body molding chamber. Thus, the compressed body of mix-powder takes the shape of the molding chamber 8, i.e. the shape of the inside of the filter frame 1. Bonding agent, such as /384 polyvinyl alcohol, which has been dried in the drying process(d) and has lubricating function, is added to the compressed body, and mix-powder is obtained by mixing in the process (e). The mix-powder is then press-molded in the process(f) into constant shape to a constant density suitable for the next step, calcination. In the process(g), it is calcinated at the temperature of 1,000 - 1,200°C. In the process (h) following, some grinding liquid, such as water, is added, for the grinding to powder form. It is again dehydrated and filtered through an apparatus such as filter press, in the process(i), and finally,

dried again in the process(j) to form mix-powder.

In this method, however, water content of the mix-powder in the process(c) is high, 40-50%, and also, the density of the resulted compressed body is uneven. This did not offer sufficient physical strength and suitable shape for the calcination process(g), requiring the press-molding process(f) and equipments for drying in the process(d), for mixing in the process(e) and for press-molding in the process(f). The result was high equipment costs and many processing steps.

The purpose of this invention, therefore, is to offer a method for producing a compressed body of mix-powder without these drawbacks.

The invention provides a method with the following characteristics: in the processes of mixing and stirring several raw powder materials and a mixing liquid such as water to obtain viscous material, and of sending it pressurized at 5kg/cm - 7kg/cm, to the filter press, filtering and dehydrating, 1.5-2 times the pressure is used instead and the water content is adjusted to 10-20%.

Explanations are given below in reference to Figure 2 and Figure 5.

Figure 2 shows the manufacturing processes of mix-powder, an example of the invented method. Figure 5 shows the structure of the filter frame, the main part of the filter press used in the example.

Under this method, the frame 11 shown in Fig.5 is used when the viscous material, mixed and stirred in the process(b), is filtered and dehydrated in the process(c). The frame has viscous material

inlet 14 at the center, four round compression-molding chambers 18 between 14 and drainages 15 which are placed at four corners of the frame; the inlet 14 and each 18 are connected by conduit pipes 16, and each 18 and each drainage are connected by drainage pipe 17. By this design, the cross-sectional areas of the inlet 14 and conduit pipes 16 could be made larger than those in the conventional design, reducing the loss in pressure in sending viscous material and thus increasing compression efficiency. It also reduces areas of the four compression molding chambers 18, increasing the pressure resistivity of the frame 11. This allows for sending the viscous material at the pressure 1.5-2 times that used in the conventional structure. By filtering and dehydrating this way, the water content of the compressed body of the mix-powder is 10-20%, with a constant density and increased physical strength. Thus, the filtering process(c) can be immediately followed by calcination process(g).

The resulted product is no different in characteristics from that made by the conventional method. By using the invented method, the processing steps enclosed by broken lines in Figure 1 could be replaced by the filtering process(c) in the Figure 2. With the elimination of the process (d), (e) and (f), the equipments also become unnecessary, which offers a significant advantage.

4. Explanation of Figures

Figure 1...Block diagram of the conventional method of producing mix-powder for ceramic.

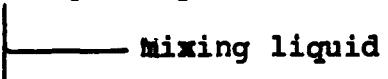
Figure 2...Block diagram of the invented method.

Figures 3 & 4...Frame, plate and cloth of the filter press /385 used in the conventional method.

Figure 5...Filter press frame used in the invented process.

1 & 11...filter frame; 2 & 12...filter plate; 3 & 13...filter clother 4 & 14...viscous material inlets; 5 & 15...filtrate drainages; 6...viscous material inlet; 7...filtrate drainage;.16...viscous material lead pipe; 17...filtrate drainage pipe; 8 & 18...compressed body molding chambers.

(a) measuring raw powder materials



(b) mixing/stirring



(c) filtering



(d) drying



(e) mixing



(f) press-molding



(g) calcinating



(h) grinding



(i) filtering

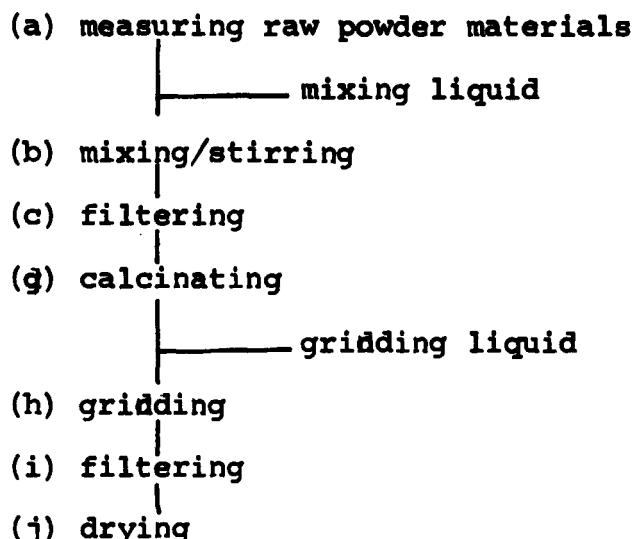


(j) drying

Figure 1

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Figure 2



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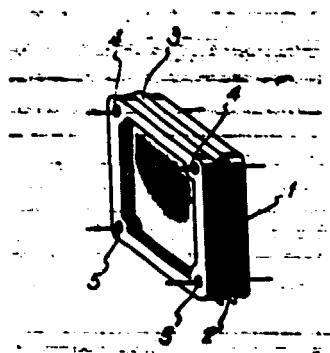


Figure 3

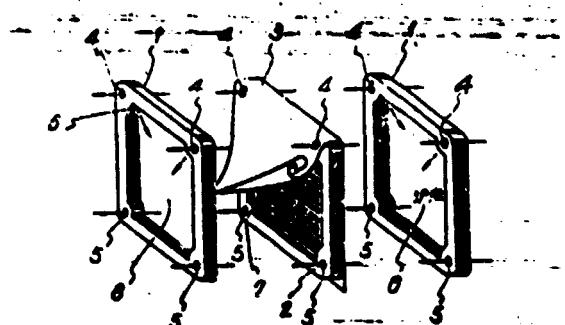


Figure 4

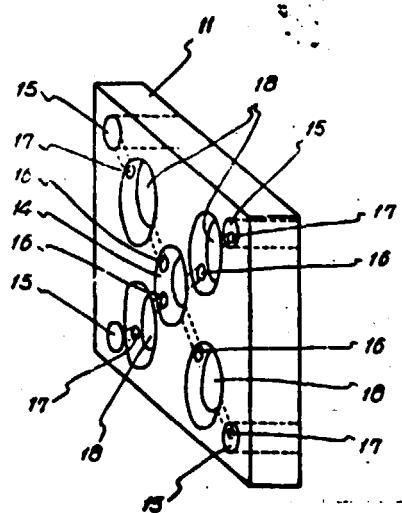


Figure 5